

CARRICULUM VITAE

Name: *Amitava Choudhuri, Ph.D.*



Present Address:

*Assistant Professor,
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Present Position:

Assistant Professor, Centre of Advanced studies, Department of Physics, The University of Burdwan (4th December 2014 onwards)

Academic Qualifications:

- 1. B.Sc. (Physics) - Rampurhat College (Burdwan University), India*
- 2. M.Sc. (Physics) - Visva-Bharati University, Santiniketan, India*
- 3. Ph.D. (Physics) - Visva Bharati University ... on nonlinear Integrable System ..*
- 4. Post-Doctoral Research Associate (PDRA) -Pondicherry University ... on Nonlinear Optics*

National Label Examinations Qualified: NET (Lectureship) (Dec. 2001, June. 2002), GATE (2002)

Ph.D. Thesis Title:

Lagrangian approach to nonlinear evolution equations

Ph.D. work in short:

The active area of research investigation during the past sixty years has been the study of solitons and related nonlinear real world phenomena that cannot be explained with the linear evolution equations. A Lagrangian based approach is derived to study the properties of some physically interesting integrable nonlinear evolution equations. The properties studied include their Lax representations, bi-Hamiltonian structures, variational symmetries for the justification of their integrability. The method is also used to seek a supersymmetric extension of the equations.

Post Ph.D. Research:

Nonlinear Optics: Higher-order nonlinear Schrodinger equations, Optical solitons, Modulational instability study, Sub-10 fs Solitonic pulse propagation in non-Kerr media, Dispersion and Nonlinear management in inhomogeneous media.

Area of Research Interest:

1. *Nonlinear Integrable systems*
2. *Symmetry analysis*
3. *Nonlinear Optics*
4. *Dynamical System Theory*
5. *Astrophysics & Cosmology*

Research interest: Apart from my Ph. D work, I also worked on the following areas:

1. **Symmetry Analysis:** We work with a formulation of Noether and Lie symmetry analysis which uses the properties of infinitesimal point transformations in the space-time variables to establish the association between symmetries and conservation laws of a dynamical system.
 - Noether-symmetry analysis using alternative Lagrangian representations, B. Talukdar, Amitava Choudhuri and U. Das, *Int. J. Theor. Phys.*, 46, 1129-53 (2007)
 - Symmetries and conservation laws of the damped harmonic oscillator, Amitava Choudhuri, Subrata Ghosh and B. Talukdar, *Pramana J. of Phys.* 70, 657-667 (2008)
 - Ambiguities in the association between symmetries and conservation laws in presence of alternative Lagrangian representations, Amitava Choudhuri, Subrata Ghosh and B. Talukdar, *Acta Physica Polonica B*, 42, 139 (2011)
2. **Nonlinear Optics:** Nonlinear optics (NLO) is the branch of optics that describes the behavior of light in nonlinear media, that is, media in which the dielectric polarization responds nonlinearly to the electric field of the light. This nonlinearity is typically only observed at very high light intensities. Working on this field I published the following articles.
 - *Dark-in-the-Bright solitary wave solution of Higher-Order Nonlinear Schrodinger equation with non-Kerr terms*, Amitava Choudhuri and K Porsezian, *Opt. Commun.* 285, 364 (2012)]
 - *Impact of dispersion and non-Kerr nonlinearity on the Modulational Instability of Higher-Order Nonlinear Schrodinger equation*, Amitava Choudhuri and K Porsezian, *Phys. Rev. A* 85, 033820 (2012)
 - *Higher-order nonlinear Schrödinger equation with derivative non-Kerr nonlinear terms: A model for sub-10-fs-pulse propagation*, Amitava Choudhuri and K Porsezian, *Phys. Rev. A* 88, 033808 (2013)
3. **Nonlinear Dynamics:** Nonlinear dynamics is the study of systems that are described by second-order differential equations. The second-order ordinary differential equation can be represented by two equivalent first-order differential equations. Writing in first-order equations we can find the equilibrium points and study the linear stability check through the critical point analysis using dynamical system theory. For the case of complicated higher-order nonlinear systems, first we have to reduce the higher-order nonlinear partial differential into a second-order ordinary differential equation through some transformation and have to apply the dynamical system theory. Working on this line we have published the following articles.
 - *Dynamical systems theory for nonlinear evolution equations*, Amitava Choudhuri, B. Talukdar, and Umapada Das, *Phys. Review E* 82, 036609 (2010)
 - *Higher-order nonlinear Schrödinger equation with derivative non-Kerr nonlinear terms: A model for sub-10-fs-pulse propagation*, Amitava Choudhuri and K Porsezian, *Phys. Rev. A* 88, 033808 (2013)
4. **Astrophysics & Cosmology:** Astronomy is one of the oldest fields of scientific enquiry. It is an observational science that studies celestial objects (planets, stars, neutron stars, black holes, pulsars, galaxies, dark matter, dark energy

etc.) which collectively make up the Universe and phenomena that may hold the key to understand their nature, as well as the origin and evolution of the Universe. **Astrophysics** is the branch of astronomy that deals with the physics of the universe, including the physical properties of celestial objects, as well as their interactions and behavior. **Cosmology** is the branch of physics and astrophysics that deals with the study of the physical origins and evolution of the Universe. It also includes the study of the nature of the Universe on its very largest scales. Working on this line I have prepared the following articles

- On the symmetries of the modified Emden type equation, Amitava Choudhuri (submitted in arxiv)

Full List of Publications

A. Papers published

Sl. No.	Article Title	Authors Name	Journals reference	Research Area
14	Higher-order nonlinear Schrödinger equation with derivative non-Kerr nonlinear terms: A model for sub-10-fs-pulse propagation http://pra.aps.org/abstract/PRA/v88/i3/e033808	<u>Amitava Choudhuri</u> and K Porsezian	Phys. Rev. A 88, 033808 (2013)	<i>Nonlinear Optics and Nonlinear Dynamics</i>
13	Impact of dispersion and non-Kerr nonlinearity on the Modulational Instability of Higher-Order Nonlinear Schrodinger equation, http://pra.aps.org/abstract/PRA/v85/i3/e033820	<u>Amitava Choudhuri</u> and K Porsezian	Phys. Rev. A 85 , 033820 (2012),	<i>Nonlinear Optics</i>
12	Dark-in-the-Bright solitary wave solution of Higher-Order Nonlinear Schrodinger equation with non-Kerr terms, http://www.sciencedirect.com/science/article/pii/S003040181101039X	<u>Amitava Choudhuri</u> and K Porsezian	Opt. Commun. 285 , 364 (2012), pp-4	<i>Nonlinear Optics</i>
11	Ambiguities in the association between symmetries and conservation laws in presence of alternative Lagrangian representations http://th-www.if.uj.edu.pl/acta/vol42/pdf/v42p0139.pdf	<u>Amitava Choudhuri</u> , Subrata Ghosh and B.Talukdar	Acta Physica Polonica B, 42 , 139 (2011)	<i>Symmetry analysis</i>
10	On complexly coupled modified KdV equations, http://www.ias.ac.in/pramana/v75/p709/fulltext.pdf	<u>Amitava Choudhuri</u>	Pramana J. Phys. 75 , 709-718, (2010).	Nonlinear Dynamics
9	Dynamical system theory of nonlinear evolution equations http://pre.aps.org/abstract/PRE/v82/i3/e036609	<u>Amitava Choudhuri</u> , B. Talukdar and U. Das	Phys. Rev. E, 82 , 036609, (2010)	Nonlinear Dynamics
8	Electron Rydberg wave packets in one-dimensional atoms http://www.ias.ac.in/pramana/v75/p471/fulltext.pdf	Supriya Chatterjee, <u>Amitava Choudhuri</u> , Aparna Saha and B. Talukdar	Pramana J. Phys. 75 , 471-483, (2010)	
7	On the supersymmetric nonlinear evolution equations http://www.springerlink.com/content/n54314p063082076/	<u>Amitava Choudhuri</u> , B. Talukdar and S. Ghosh	Nonlinear Dynamics, 58 , 245-258 (2009)	<i>Integrable systems and Symmetry analysis</i>
6	On the quantization of Damped Harmonic Oscillator	Subrata Ghosh, <u>Amitava Choudhuri</u> and	Acta Physica Polonica B, 40 , 1001-1009 (2009)	

	http://th-www.if.uj.edu.pl/acta/vol40/pdf/v40p0049.pdf	B. Talukdar		
5	Symmetries and Conservation Laws of the damped Harmonic oscillator www.ias.ac.in/pramana/v70/p657/fulltext.pdf	<u>Amitava Choudhuri</u> , Subrata Ghosh and B. Talukda	Pramana J. Phys., 70 , 657-67 (2008)	<i>Symmetry analysis</i>
4	Modified KdV hierarchy : Lax pair representation and bi-Hamiltonian structure http://arxiv.org/abs/0801.1763	<u>Amitava Choudhuri</u> , B. Talukdar and U. Das	Z. Naturforsch, 64a , 171-179 (2009)	<i>Integrable systems</i>
3	Noether-symmetry analysis using alternative Lagrangian representations http://www.springerlink.com/content/x1066g141637p8w5/	B. Talukdar, <u>Amitava Choudhuri</u> and U. Das	Int. J. Theor. Phys., 46 , 1129-53 (2007)	<i>Symmetry analysis</i>
2	Lagrangian approach to dispersionless KdV hierarchy http://www.emis.de/journals/SIGMA/2007/096/	<u>Amitava Choudhuri</u> , B. Talukdar and U. Das	SIGMA 3 , 096 (2007)	<i>Integrable systems and Symmetry analysis</i>
1	On a Generalized Fifth-Order Integrable Evolution Equation and its Hierarchy, http://arxiv.org/abs/nlin/0603038	<u>Amitava Choudhuri</u> , B. Talukdar and S. B. Datta	Z. Naturforsch, 61a , 7-15 (2006)	<i>Integrable systems</i>

b. Book Published: *Nonlinear Evolution Equations: Lagrangian Approach*

(Lambert Academic Publication, Germany, ISBN: 978-3-8454-4180-1, August 2011)

The speciality of this book : The active area of research investigation during the past sixty years has been the study of solitons and related nonlinear real world phenomena that cannot be explained with the linear evolution equations. A Lagrangian based approach has been derived to study the properties of the nonlinear evolution equations. This book will provide the background of fundamental ideas and classical Lagrangian approach to understand nonlinear real-world wave phenomena, condition for integrability, Lagrangian and Hamiltonian formulation of the integrable systems, water wave soliton, symmetry analysis of both discrete and continuous systems, supersymmetric realization from variational study and some important methods for solving the nonlinear equations up to the level of present-day active research on these and related topics. The ideas from this book will stimulate future research on understanding the nonlinear problems and may be a useful source book for researchers, graduate students enrolled in M.S and Ph.D degree programmes.

c. Seminars/Conferences/Schools attended:

Sl. No.	Conferences/Seminars	Title of paper read	Place/year
1	Third SERC school on nonlinear dynamics		Indian Association for the Cultivation of Science, Kolkata, December 4-23, 2006
2	National seminar on Generalizations and Approximations in Mathematics	Variational symmetry of dispersionless KdV equation	Department of Mathematics, Visva-Bharati, March 28-29, 2008
3	Conference on Laser Applications in Basic and in Applied Sciences (CLBAS-2009)		Department of Physics, Visva-Bharati, February 14-17, 2009
4	One day (Micro) seminar on Nonlinear Systems		Department of Mathematics, Visva-Bharati, 27 th August, 2010

5	International Conference on Frontiers in Applied Mathematics and its Computational Aspects (ICFAM-CA: 2011)	Linear dispersionless nonlinear evolution equations with mixed derivative	Department of Applied Mathematics, University of Calcutta, March 15-17, 2011
6	National seminar on Analysis of Nonlinear Systems (ANS-2011)	Linear dispersionless nonlinear evolution equations: KdV- and CH equations	Department of Mathematics, Visva-Bharati, March 26-27, 2011
7	Micro-seminar on Nonlinear Phenomena	Dark-in-the-Bright solitary wave solution of Higher-Order Nonlinear Schrodinger equation with non-Kerr terms	Department of Mathematics, Bethun College, Kolkata (Sept 23, 2011)
8	State Level Technical Seminar on Recent Advancement in nanotechnology		Department of Physics, Government Arts College, Tiruvannamalai, Tamilnadu 5-6 August, 2011
9	National Conference on Recent Advances in Numerical Methods and its Application – RANMA -2014	Spatially flat FRW Universe filled with Bulk-Viscous Fluid : A Symmetric Approach	Department of Mathematics (Ramanujan School of Mathematical Sciences), Pondicherry University, Puducherry-605014 , 27-28 January, 2014

Teaching experience:

Sl. No.	Title of course taught	Postgraduate/ Undergraduate/ (University/Institution)	Sole instructor or with others	Year
1	M.Sc Astrophysics Topics: Physics 1. Classical Mechanics, 2.Nuclear & Particle Physics, 3.Electrodynamics*, 4. Mathematical Method* 4.General Physics Practicals Astrophysics 1.Radiative transfer Astrophysics 2. Stellar physics* 3. General Theory of Relativity	Postgraduate (Pondicherry University)	Sole Instructor *partly with other	August 2012 to Nov. 2014 (2 yrs 4 months)
2	B. Tech (first year) Topics: Basic Engineering Physics and Practicals	B. Tech (Bengal Institute of Technology and Management, BITM)	Sole Instructor	16 th July, 2010 – 19 th April, 2011 (10 months)
3	B.Sc. I and B.Sc. II (Subsidiary) (Topics: Mechanics, Modern Physics, Practical) B.Sc. I and B.Sc. II (Honours) (Topics: SC/ST/Minority coaching- Mechanics)	Under graduate (Visva-Bharati University)	With some permanent teacher	4 years

Research experiences :

Name of Organisation/ Institution	Position Held	Duration		Nature of work	Reason for leaving
		From (Date)	To (Date)		
Pondicherry University	Research Associate (Post-PhD)	26 th April 2011	31 st July, 2012	Research Work on Nonlinear optics	Selected for Guest Faculty
Visva-Bharati University	Project Fellow	July 27, 2007	March, 2010	Research work on Variational Studies of Higher-Order Nonlinear Evolution Equations	Ph.D work
Visva-Bharati University	Project Fellow	Feb. 17, 2005	Dec. 2006	Research Work on Dynamics of higher order constrained systems	Ph.D work
IIT, Kharagpur	Project Associate	Dec 10, 2002	April, 2004	Research work Using HI Observation to probe Cosmology	Project work

** Biographical inclusion in Marquis Who's Who-2013 (2013 30th Pearl Anniversary edition of Who's Who in the World)*

Articles Reviewed of the following journals:

1. Indian Journal of Physics (IJP),
2. International Journal of nonlinear sciences and numerical simulation.

(Dr. Amitava Choudhuri)